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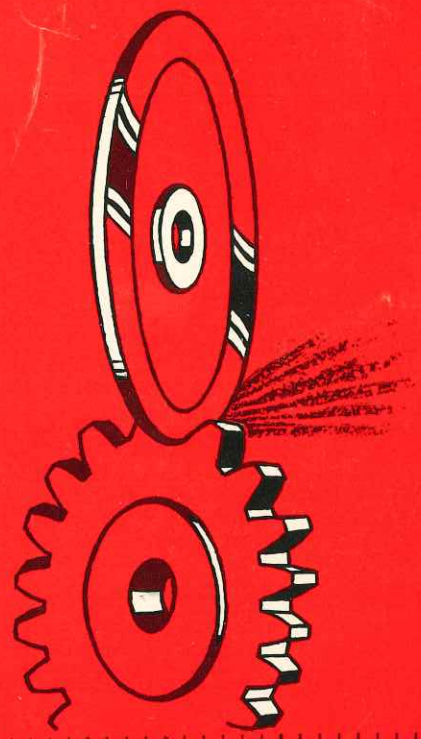
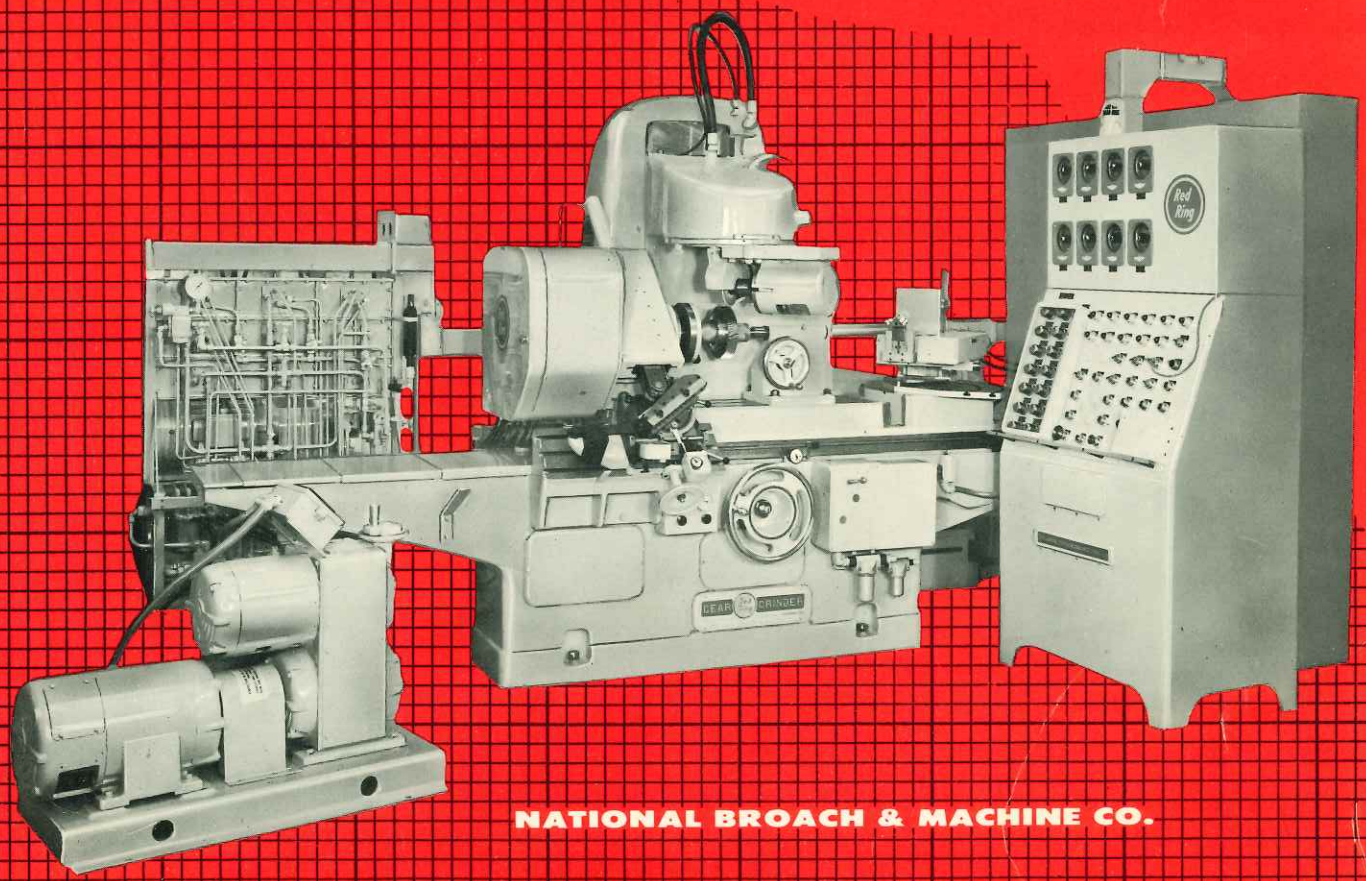
SAME ADVERTISED EARLIER
IN GRINDING AND
FINISHING-



gear grinding becomes a science



NATIONAL BROACH & MACHINE CO.

The new Red Ring SGJ and SGK Gear Grinders are unique in combining so many valuable production capabilities

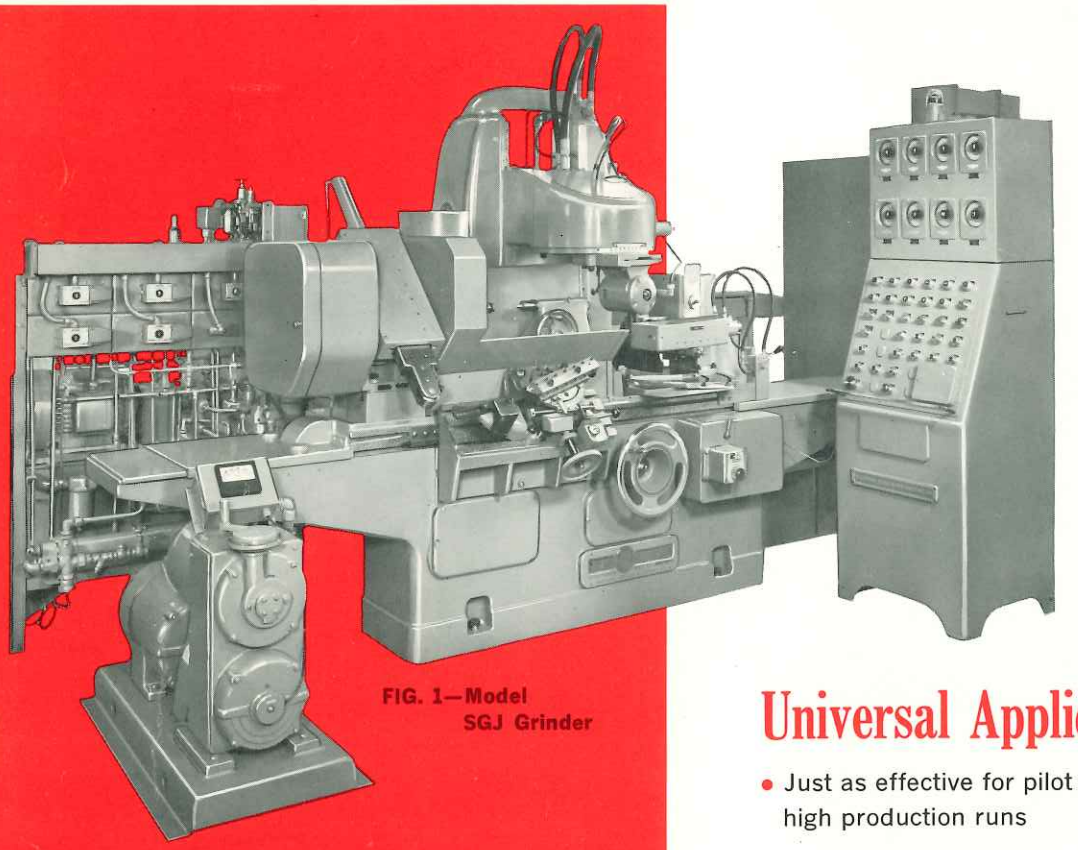


FIG. 1—Model SGJ Grinder

FIG. 2—Equipped for external gear grinding

Universal Application

- Just as effective for pilot or experimental gears as it is for high production runs
- Equally applicable to both internal and external spur gears, helical gears, shoulder gears and splines
- Straight, Tapered or Crowned tooth forms may be ground
- Modified or true involute tooth profiles may be ground

Automatic Control

Critical machine functions under selective Automatic Precision Control include:

- Lead
- Indexing
- Table Speed and Stroke Length
- Grinding Wheel Speed
- Wheel Downfeed, both quantity and size of Increments
- Feed Sequences—Roughing (either of two methods), Semi-Finishing, Finishing and Spark-out
- Frequency of Wheel dressing

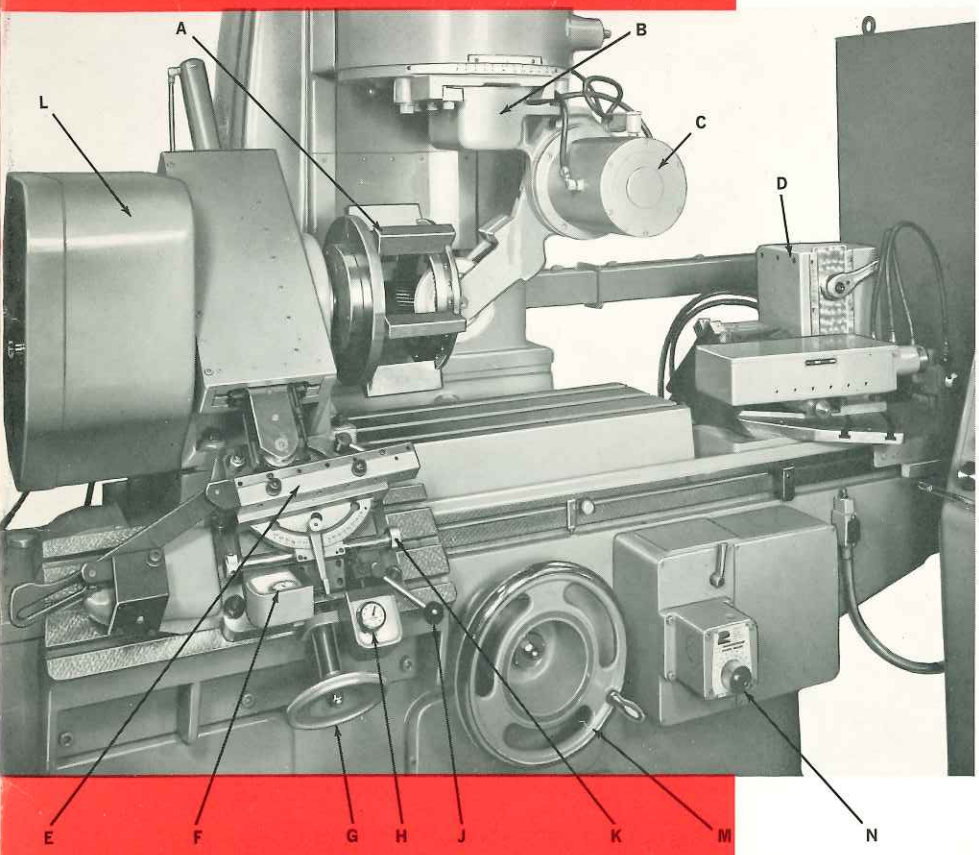


FIG. 3—Grinder equipped for internal gears

A. Work-holding fixture
B. Grinding head adapter with angle-setting vernier
C. Grinding wheel spindle drive motor, enclosed
D. Grinding wheel dresser
E. Sine bar
F. Indicator for fine angle setting
G. Stock-dividing or tangential feed manual control
H. Tangential feed indicator
J. Stock-dividing head lock
K. Minute adjustment of helix angle
L. Index head
M. Manual feed
N. Table speed hydraulic control

Repeatability

Consistent tolerances are maintained, gear after gear.

Easy Set-Up and Change-Over

All precision settings are made by means of graduated dials, micrometers, vernier scales and indicators.

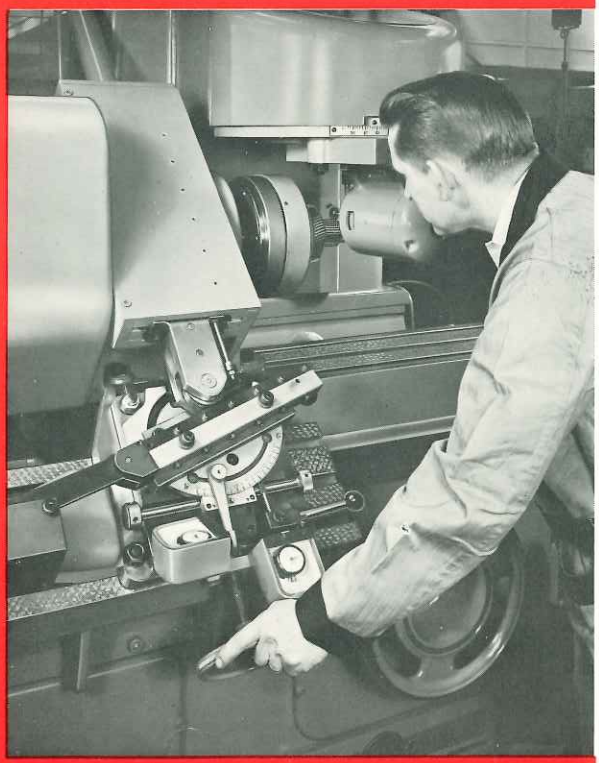


FIG. 4—Grinding a shoulder gear

Only Tooling Required

- Index Plate
- Wheel Trimmer Form Masters
- Work Arbor or Locating Chuck

Easily Adjustable Controls

In addition to the controls mentioned above, this grinder is provided with:

- A servo-controlled table reversing system
- Precision master plate indexing system
- An infinitely variable-speed grinding wheel spindle drive with speed available, up to 20,000 rpm

Lead is accurately developed by a sine bar and a differentially preloaded roller follower mechanism which controls the rotation of the work spindle. Setting is verified by a precision dial readout. See Fig. 3.

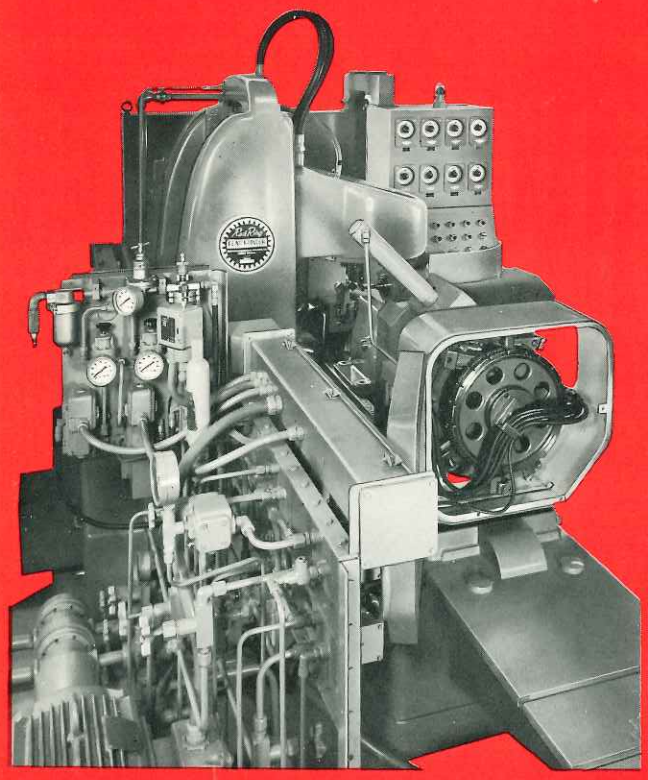


FIG. 5—Indexing system

FIG. 6—Wheel dressing mechanism

Selective Modes of Rough Grinding

MODE 1: The wheel downfeeds incrementally a preselected number of times at one or both ends of each stroke before indexing to the following tooth. This is repeated until all teeth are ground to prefinished depth.

The length of table stroke is controlled to slightly more than the tooth length until the final roughing stroke. On the final stroke, the length is automatically increased to permit clearance for indexing, thus, keeping grinding time to a minimum.

MODE 2: The wheel downfeeds only one increment at the start of the cycle. The table then reciprocates and the gear indexes from tooth to tooth until all teeth around the gear are ground. This is repeated with added downfeed increments until all teeth are ground to pre-finishing depth.

Semi-Finish, Finish and Spark-Out

The sequence for finishing (Semi-Finish, Finish, and Spark-out) starts with two passes (forward and return) for each tooth completely around the gear at the same downfeed wheel setting. The wheel is then downfed another increment and the grinding sequence repeated as often as necessary to attain finish size.

Wheel Dresser

The grinder is normally equipped with a semi-automatic hydraulically actuated wheel dresser.

The machine cycle may, at any time, be interrupted for the purpose of wheel dressing. On pre-selected demand, the table moves to "trim position" with the grinding wheel elevated to the proper height for trimming. The operator then, by shifting a lever, dresses both sides of the wheel. With the dressing completed, a push button control on the console strokes the table back to the grinding area and lowers the wheel automatically to the correct grinding elevation, regardless of the amount of stock removed from the wheel during dressing.

A fully automatic dresser may be supplied if desired.

FIG. 7—Control Console

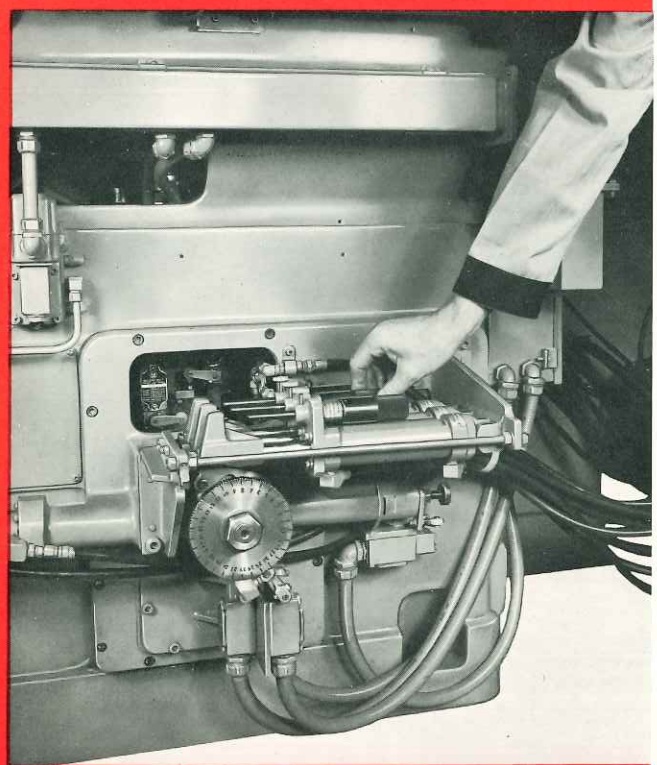


FIG. 8—Micrometer screw for setting downfeed, with actuating cylinders below. Feed-indicating ratchet plate in the foreground

Control Console

Setting dials for the following functions are conveniently located on the control console. See Fig. 7.

- Index Count—total number of gear teeth
- Trim Count (Number of indexes before table returns to "trim" position including three separate selections for rough, semi-finish and finish grinding)
- Feed Increment Count including three separate selections for rough, semi-finish and finish grinding
- Spark-out—number of indexes to complete the gear
- Table reversing position

Size of Downfeed Increments

The size of downfeed increments from 00025″ to 00225″ are set on individual micrometer screw units—one for each type of cycle (rough grind, semi-finish and finish grind). These are located at the rear of the machine. See Fig. 8. Maximum feed is .032″.

A supplemental method of reducing the number of downfeeds without changing the finish size setting is also provided.

Stock Dividing

A handwheel actuated stock divider is used to roll-position the work gear to assure uniform stock removal from both sides of the gear teeth.

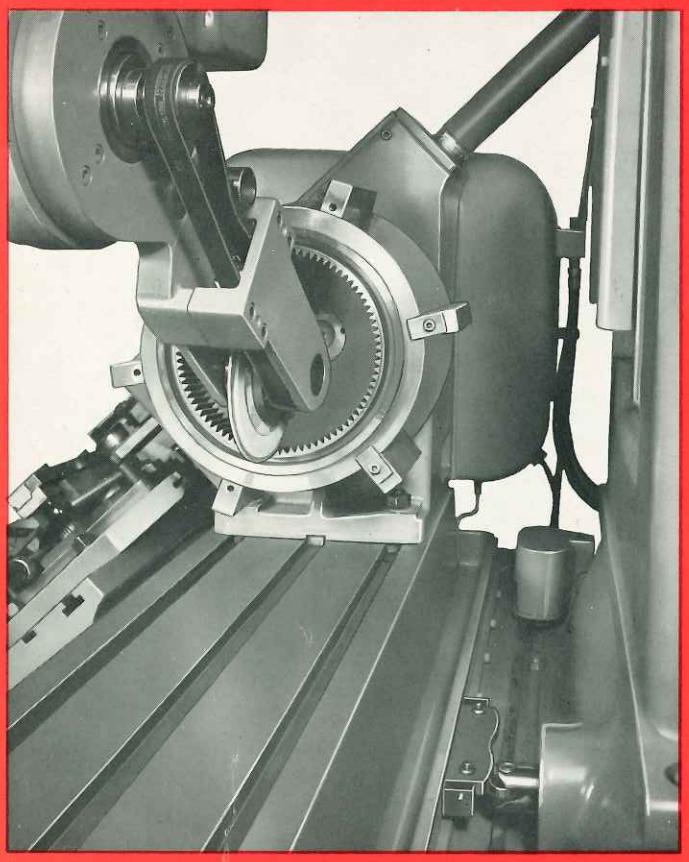


FIG. 9—Crowning cam and follower to the right of the table

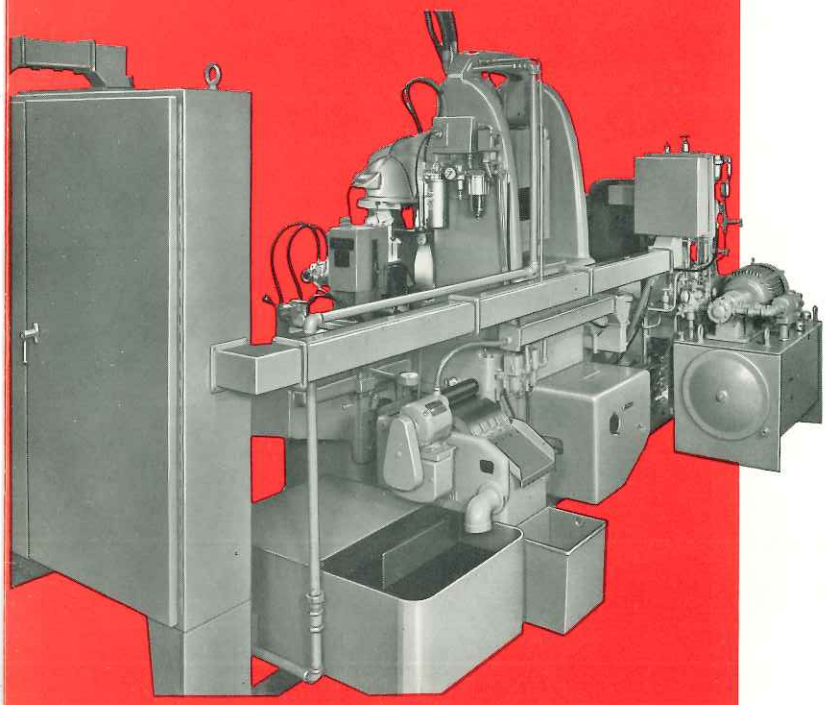


FIG. 10—Rear view of grinder—hydraulic pump and drive unit at extreme right—magnetic chip separator in the foreground

Crowned Tooth Form Grinding

The Elliptoid or crowned tooth form (cam-controlled) is ground as readily and as effectively as the conventional straight tooth form.

Standard Equipment

Basic machine

Control console and control panel

Hydraulic power unit

Heat exchanger and temperature control for hydraulic system

External grinding wheel spindle and motor assembly

Coolant system and external coolant tank

Variable-speed spindle control unit

Sine bar arrangement

Automatic indexing headstock

Automatic wheel infeed (downset)

Cone-lok tailstock

Selective grinding cycle

Optional Equipment

Crowning arrangement

Grinding wheel spindle and motor assembly for shoulder gears or internal gears

Red Ring wheel dresser

Hoglund wheel dresser

Coolant filter

Index plates and tooling

Spur Gear and Spline Grinder

When production is confined to spur gears and splines, Models SGD and SGC provide all the necessary precision grinding facilities needed.

Maximum, vibrationless rigidity is assured by a massive internally ribbed cast base with double box column, designed to eliminate overhang.

Responsive Hydraulic Drive

The table, solidly supported on vee and flat ways, is hydraulically actuated. Speed is infinitely variable under convenient manual control. Ways are adequately shielded from airborne grit by telescoping metal covers.

Precision Indexing

The automatic hydraulically actuated indexing mechanism is integral with the headstock.

Indexing is controlled by a master disc or plate, ground to a tooth-to-tooth tolerance of .0001″ and a full circle tolerance of .0003″.

Normally, table reciprocation stops automatically at the end of a complete revolution of the master disc. However any faulty indexing operation stops the table instantly.

Disc control may be disengaged for set-up operations.

FIG. 11—Spur and Spline Grinder, Model GSD or SGC 12″

Grinding Head

The grinding head slide, carried on 4 vertical ways, is positioned and fed by a large handwheel having a graduated reference scale.

The rigidly mounted spindle is axially adjustable to accommodate wheels of varying width. No interference to direct spark-out observation.

Specifications and Capacities

	MODEL SGJ				MODEL SGK	
	12″		18″		24″	
ITEM	SPUR	HELICAL	SPUR	HELICAL	SPUR	HELICAL
Helix Angle, R or L, Max.		35°		35°		45°
Lead, Min.		22″		36″		46″
Swing Dia., Max.	21″	21″	24″	24″	31″	31″
Faceplate Dia.	9″	9″	9″	9″		
Table Stroke	32″	32″	32″	32″	48″	48″
Table Speed, Max., fpm	25	25	25	25	25	25
Indexes, Number, Max.	220	220	220	220	260	260
Index Plate, Dia.	14″	14″	16″	16″	20″	20″
For External Gears						
℄ Wheel to ℄ Work	2½″-12″	½″-10″	5½″-15″	3½″-13″	6¾″-20¾″	4¾″-18¾″
P.D. Work, Max.	12″ (12″ Wheel)	12″ (8″ Wheel)	18″ (12″ Wheel)	18″ (8″ Wheel)	24″ (16″ Wheel)	24″ (12″ Wheel)
Root Dia. Work, Min.	1″	1″	1″	1″	4″	4″
Length Between Centers, Max.	16¾″	16¾″	16¾″	16¾″	24″	24″
For Internal Gears						
P. D. Work, Max.	13″	13″	16″	16″	24″	24″
P. D. Work, Min.	Dependent on part requirements (variable)					
Face Width, Max.	Dependent on configuration of parts					
Weights, Approx., Lbs.:						
Net	13000	13000	14000	14000		
Crated	15000	15000	16000	16000		
Boxed	16000	16000	17000	17000		
Size of Boxes, cu. ft.						
One	665	665	750	750		
One	400	400	400	400		

MODELS SGD-12″ AND SGC-18″ SPUR GRINDERS		
MODEL	SGD-12″	SGC-18″
P. D. Work, Max.	12″	18″
Height—Table to ℄ of Work	6½″	9¼″
℄ Wheel to ℄ Work, Max.	17¾″	15″
℄ Wheel to ℄ Work, Min.	2½″	0″
Grinding Wheel Dia., Standard	7″	10″
Grinding Wheel Hole Dia.	1¼″	3″
Grinding Wheel Width, Max.	⅝″	⅞″
Wheel Speed rpm (can be varied)	3450	2070
Table Speed Max., sfpm	32	32
Coolant Reservoir Capacity, gal.	42	42
Hydraulic Reservoir Capacity, gal.	60	60
Length	12′-3″	12′-3″
Width	5′-6″	5′-6″
Height	6′-3″	6′-3″

WORLD'S LARGEST PRODUCER OF GEAR SHAVING AND HONING EQUIPMENT

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